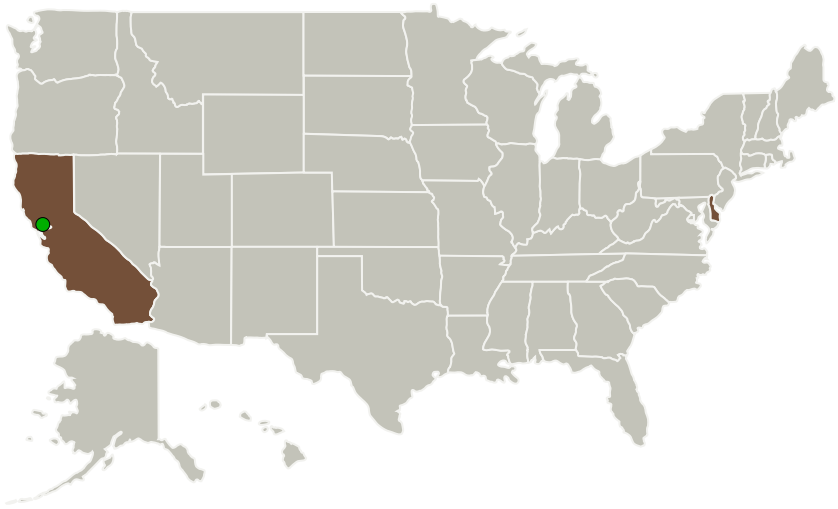
Enhanced Membrane System for Recovery of Water from Gas-Liquid Mixtures, Phase I

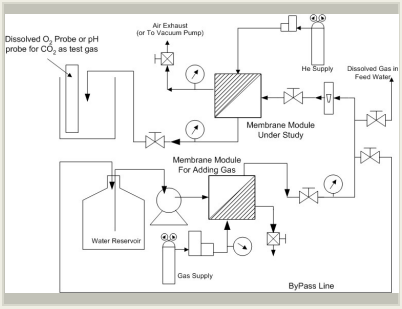
Completed Technology Project (2014 - 2014)

Project Introduction

Gas-Liquid separation is an acute microgravity problem. Existing devices use centrifugal motion on microporous membranes to separate the two phases. Centrifugal devices consume electricity and are prone to failure. The microporous membranes easily foul and have significant water loss. Novel membrane devices are proposed. Membranes can simultaneously disengage gases from gas-liquid dispersion and degas water. Membrane is compact, lightweight and with no moving parts, consumes no electricity during gas-liquid separation and provides enhanced simplicity. Product is novel nonporous high gas flux, high temperature perfluoropolymers. Gas-liquid dispersion/solution enters module and dispersed/dissolved gases permeate through membrane. Degassed water leaves device. Degassing of water is independent of water pressure. Therefore operating at low pressure is desirable. Non-porous nature minimizes fouling. Thousands of systems have been sold over the last 10 years for degassing transformer oil. Water vapor losses are simultaneously reduced. Key innovations include development of fouling resistance high temperature hydrophobic Hollow Fiber (HF) system for degassing gas-liquid. By flowing gas-liquid feed on outside of wound HF, both gas and liquid feed are well mixed and exposed to membrane non-porous surface. Industrial partners have been established. Phase I will demonstrate gas-liquid separation and superior performance in fouling resistance and water loss compared to Microporous HF controls. Partners are positioned to actively participate in Phase II and commercialization.

Primary U.S. Work Locations and Key Partners





Enhanced Membrane System for Recovery of Water from Gas-Liquid Mixtures Project Image

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Small Business Innovation Research/Small Business Tech Transfer

Enhanced Membrane System for Recovery of Water from Gas-Liquid Mixtures, Phase I

Completed Technology Project (2014 - 2014)

Organizations Performing Work	Role	Type	Location
Compact Membrane Systems, Inc.	Lead Organization	Industry	Newport, Delaware
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Delaware

Project Transitions

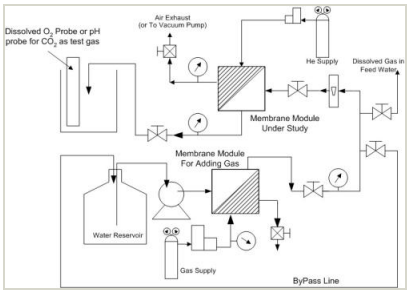
June 2014: Project Start

December 2014: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/137676)*

Images



Project Image
Enhanced Membrane System for Recovery of Water from Gas-Liquid Mixtures Project Image *(https://techport.nasa.gov/image/126599)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Compact Membrane Systems, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

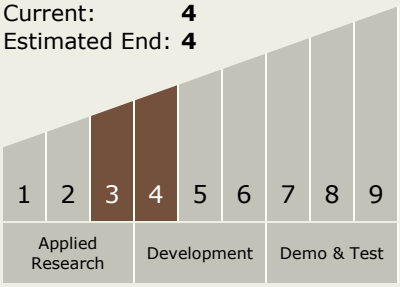
Carlos Torrez

Principal Investigator:

Kenneth Pennisi

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



Enhanced Membrane System for Recovery of Water from Gas-Liquid Mixtures, Phase I

Completed Technology Project (2014 - 2014)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.1 Environmental Control & Life Support Systems (ECLSS) and Habitation Systems
    - TX06.1.2 Water Recovery and Management

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System